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THE OPTIC SYSTEM OF THE EYE

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In the various works on physiologic optics the eye as an optic system is discussed, values for the foci and the principal planes are given, but the actual computation is left to the reader.

Tscherning, in his book on physiologic optics, devotes a chapter to the eye as an optic system which is very complete as to final results. As an adjunct to this chapter the following article is submitted with the various formulae and the method of computation.

The constants of the eye as given by Tscherning are from experiments and measurements made of the horizontal meridian of his right eye. The values of the indices were checked against those found by Helmholtz, Matthiessen, Young and Listing, and are in close agreement.

The index of the crystalline lens presented difficulty as very little is known as to its true value. The crystalline, we know, is not homogeneous, in that, the index of the nucleus is greater than that of the peripheral portions.

Thomas Young calculated the index of the crystalline to be 1.436 with the index of the nucleus at 1.412. Listing gave 1.455 for the total index, which was adopted by Helmholtz. Helmholtz later considered 1.4371 as a more accurate index, which shows close agreement with Young. Matthiessen determined a law for the index, from which he calculated the total index of the crystalline. He considered that "the difference between the total index and that of the superficial layers would be double the difference between the index of the nucleus and that of the cortical layers" (page 37, Tscherning). He thus found 1.437 as the total index. Tscherning, for want of more accurate results, considers 1.42 as the total index of the crystalline.

The posterior surface of the cornea is usually neglected by writers but Tscherning has determined its radius to be very close to that if the posterior surface of the crystalline. In our computations it is necessary to consider this surface as it is a boundary line between two media of slightly different indices.

The eye has been likened to the camera, or rather, the camera has been patterned after the eye. In computing the optic system of the camera, or kodak, each lens, or component, is considered separately. So also, must computations on the optics of the eye be made.

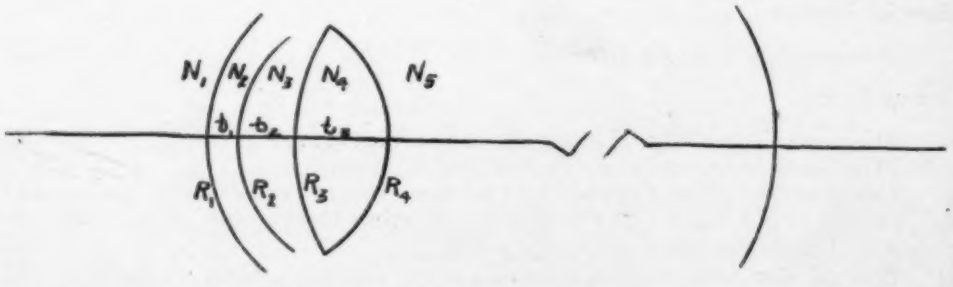


Fig. 1. Explanatory diagram multiplied three times to show the constants of the eye. N, index; t, thickness; R, radius.

The Optic Constants of the Eye according to Tscherning are as follows (Fig. 1):

$R_1 = -7.98$
$R_2 = -6.22$
$R_3 = -10.20$
$R_4 = +6.17$
$t_1 = 1.15$
$t_2 = 2.39$
$t_3 = 4.06$
$N_1 = 1.000$
$N_2 = 1.377$
$N_3 = 1.3365$
$N_4 = 1.420$
$N_5 = 1.3365$

The Posterior Focus of the Eye

Every optical system has cardinal points. These points are the anterior and the posterior foci, principal points and the nodal points. The theory Gauss determines these points for us.

We will first determine the posterior focus of the eye, using the formula for surface refraction. The posterior focus is that point to which originally parallel rays are converged after refraction. Thus, we will consider a ray of light piercing the anterior surface of the cornea in a direction parallel to the principal axis.

In the formula for surface refraction;

$$\frac{N}{v} - \frac{1}{u} = \frac{N-1}{R}$$

where, N equals relative index
v equals image distance from the pole
u equals object distance from the pole
and R equals radius of the surface of refraction
we have, when substituting the values above;

$$\frac{1.377}{v_1} - \frac{1}{\infty} = \frac{1.377 - 1}{-7.98}$$

(all distances are according to the English convention of signs which considers "distances are measured along the axis from the pole; when the direction of measurement is opposite to that in which the incident light travels, the distance is positive; distances measured in the reverse direction are negative.") N being relative index equals $\frac{N_2}{N_3}$, i. e. the index of the media toward which light travels over that from which it comes. Thus N in the equation above may be written

$$\frac{1.377}{1} \text{ or } \frac{\text{index of cornea}}{\text{index of air}} \quad \frac{1}{\infty} \text{ being}$$

equivalent to an infinitesimal number we drop it and have

$$\frac{1.377}{v_1} = \frac{1.377 - 1}{-7.98}$$

or $v_1 = -29.147$

which is the point on the principal axis at which the image would be formed if the second surface were not there. This point now becomes the object point for the second surface, and considering thickness, we have,

$$u_2 = v_1 + t_1$$
$$= -29.147 + 1.15$$
$$= -27.997$$

continuing as before we have,

$$\frac{N}{v_2} - \frac{1}{u_2} = \frac{N-1}{R_2}$$

N, relative index, in this case being $\frac{N_3}{N_2}$ and equal to 0.9706.

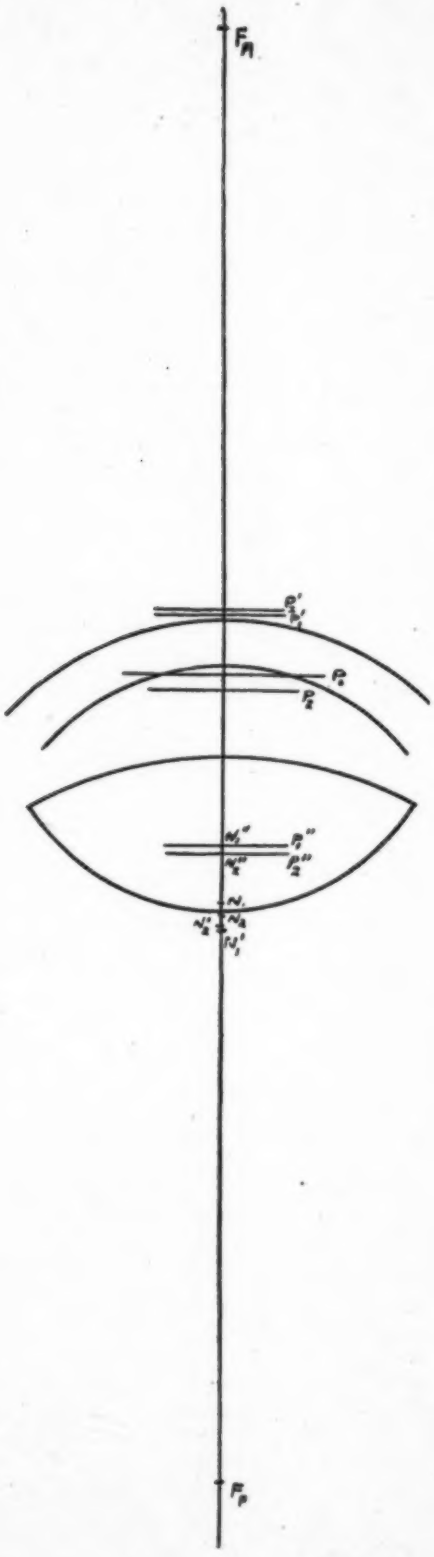
Substituting;

$$\frac{0.9706}{v_2} + \frac{1}{27.997} = \frac{0.9706 - 1}{-6.22}$$

and solving for v_2
we obtain, $v_2 = -31.32$.

The object distance for the third surface (anterior surface of the lens) will then be, $u_3 = v_2 + t_2$
$= -28.93$.

So that, referring to our surface refraction formula, substituting and solving we obtain, $v_3 = -26.11$. By the same process for the fourth surface we have, $v_4 = -17.15$, which is the posterior focus of the eye as measured from the posterior surface of the lens. This point should be on the retina, all things being equal. The location of the retina



or the posterior focus as measured from the anterior pole of the eye will be, $v_4 + t_3 + t_2 + t_1 = 24.75$ mm.

The Anterior Focus

The anterior focus of the eyes is determined in the same manner but by reversing the action of the light. Thus, assuming a parallel ray within the eye presented to the posterior surface of the lens as the first surface, we obtain, successively by the same formula,

$$v_1 = -104.89$$
$$v_2 = -60.02$$
$$v_3 = -82.54$$
$$\text{and} \quad v_4 = -15.59$$

v_4 being the distance from the anterior pole of the cornea to the anterior focus, which is before the eye. We have now located the anterior and the posterior foci of the eye.

The Cornea as an Optic System

It is necessary to consider each component as a separate system, locating the principal planes and foci of each, before combining them into a single system.

Thus, in considering the cornea and locating the foci, we have, from the formula,

$$f_1 = \frac{-R}{N-1}$$
$$f_1 = 21.17$$
$$\text{and} \quad f_2 = \frac{RN}{N-1}$$
$$f_2 = 205.34$$

Fig. 2. Showing the location of the nodal points and the principal planes. Multiplied five times. P_1', P_2', principal planes of the cornea; N_1', N_2', nodal points of the cornea; P_1'', P_2'', principal planes of the crystalline; N_1'', N_2'', nodal points of the crystalline; P_1, P_2, principal planes of the eye; N_1, N_2, nodal points of the eye; FA, anterior focal point of the eye; FP, posterior focal point of the eye.

f_1 being the first focal distance of the first surface and f_2 being the second focal distance of the second surface.

The formula for the refraction of a lens separating media of different refractive indices is obtained by combining the formulae for refraction at the first and the second surfaces and solving so that we obtain,

$$F^1 = -\frac{N_2 f_1 f_2}{N_2 (N_1 f_2 - N_3 f_1) + N_1 N_3 t}$$

Hence, by substituting and solving, we have,

$$F^1 = -24.40$$

In the case of different media on opposite sides of a lens the focal distances of the lens are numerically unequal, being in the ratio of the refractive index of the first, to that of the second medium. F^1 then being the increment, which, multiplied by N_1 and N_3, gives for us F_1 and F_2, the first and the second focal distances, respectively, of the cornea. Thus, $F_1 = -24.40$ and $F_2 = -32.61$. The respective distances of the first and the second principal points from the first and the second surfaces of the cornea will be,

$$A^1 = N_1 A$$

and

$$B^1 = N_3 B$$

Thus, alpha $= \dfrac{N_1 N_3 f_1 t}{N_2(N_1 f_2 - N_3 f_1) + N_1 N_3 t}$

and, beta $= \dfrac{N_1 N_3 f_2 t}{N_2(N_1 f_2 - N_3 f_1) + N_1 N_3 t}$

Hence, $A^1 = 0.133$

and $B^1 = 1.29$

The nodal points are separated by a distance equal to that between the principal points and occupy a conjugate position to the principal points in reference to the anterior and the posterior focal lengths.

As, $P_2 N_2 = F_1 + F_2$

and, $P_1 N_1 = F_1 + F_2$

therefore, $P_2 N_2 = P_1 N_1 = -8.21$

The Crystalline as an Optic System.

The crystalline lens as a separate system does not present the complications that the cornea does as it is in a homogeneous medium. As before, we must calculate for f_1 and f_2, so,

$$f_1 = -\frac{R}{N - 1}$$

$$f_1 = 163.20$$

and, $$f_2 = \frac{RN}{N - 1}$$

$$f_2 = -98.76$$

as, $$f = \frac{-N f_1 f_2}{N (f_2 - f_1) + t}$$

we obtain, by substituting and solving, a value for f of -62.44. This value is the value for the distance from the second principal point to the second focal point, and as, $P_1 F_1 = -P_2 F_2$ the primary focal distance of the crystalline is $+62.44$ mm. The alpha and the beta distances, or the distances of the first and the second principal points from the first and the second surfaces, respectively, are located by the formulae:

$$\text{alpha} = \frac{f_1 t}{N (f_2 - f_1) + t}$$

and, $$\text{beta} = \frac{f_2 t}{N (f_2 - f_1) + t}$$

Hence, alpha $= -2.42$

and, beta $= 1.46$

In homogeneous media the nodal points coincide with the principal points, therefore, alpha and beta locate them.

The Eye

As we now have the cardinal points of the major components of our optic system we are ready to combine them into one. So, by referring to the data obtained on the cornea and the crystalline as separate systems and by presenting formulae in use in combining different optic systems into one, we have, for the posterior focal length,

$$Fp = \frac{N_3 f^1_2 f^{11}_2}{N_3 (f^1_2 + d) + N_2 f^{11}_2}$$

in which f^1_2 = second focal distance of the cornea

f^{11}_2 = second focal distance of the lens

$d = -\text{alpha}^{11} + t_2 + \text{beta}^1$.

alpha^{11} = alpha distance of the lens

beta^2 = beta distance of the cornea

d being the distance from P_1 of the lens to P_2 of the cornea.

Substituting and solving;

$$Fp = -22.89$$

The resulting formula for the anterior focus of a combination is;

$$Fa = \frac{N_1 f_1 f^{11}_1}{N_1 (f^{11}_1 - d) + N_2 f^1_1}$$

where

f^1_1 = first focal distance of the cornea.

f^{11}_1 = first focal distance of the lens.

So that, by substituting and solving we obtain a value for the anterior focus;

$$Fa = 17.12$$

Locating P_1 and P_2 by the alpha and the beta formulae we have;

$$\text{alpha} = \frac{-N_1 f^1_1 d}{N_1 (f^{11}_1 - d) + N_2 f_1}$$

$$\text{alpha} = -1.67$$

$$\text{beta} = \frac{N_2 f^{11}_2 d}{N_1 (f^{11}_1 - d) + N_2 f^1_1}$$

$$\text{beta} = 4.28$$

Summary

Summarizing the material thus gathered, we have, for the optic system of the cornea, the following values;

Position of $P_1 = 0.13$
Position of $P_2 = 0.14$
Position of $N_1 = -8.08$
Position of $N_2 = -8.07$
Position of $F_1 = 24.53$
Position of $F_2 = -32.47$
Anterior Focus $= 24.40$
Posterior Focus $= -32.61$

Positions are the distances as measured from the anterior pole of the cornea as a point of reference, negative values being in a direction backward along the principal axis and positive being in a direction before the eye. The anterior focus is measured from the first principal point and the posterior focus is measured from the second principal point.

For the optic system of the crystalline, we have,

Position of $P_1 = -5.96$
Position of $P_2 = -6.14$
Position of $N_1 = -5.96$
Position of $N_2 = -6.14$
Anterior Focus $= 62.42$
Posterior Focus $= -62.42$

Position, as before, being measured from the anterior pole of the cornea as a point of reference and the focal distances being measured from the principal points.

For the optic system of the eye, we have,

Position of $P_1 = -1.54$
Position of $P_2 = -1.86$
Position of $N_1 = -7.30$
Position of $N_2 = -7.62$
Position of $F_1 = 15.59$
Position of $F_2 = -24.72$
Anterior Focus $= 17.13$
Posterior Focus $= -22.89$

Position being measured from the anterior pole of the cornea as a point of reference.

Sufficient data has been obtained from the above calculations for any measurement desired in the meridian in which the computations have been made and for the eye in question.

The Dioptric Power of the Eye

The dioptric power of a surface may be found from the formula

$$D = -\frac{N - 1}{R}$$

so that, surface powers of the eye will be, in this case,

$D_1 = 47.24$
$D_2 = -4.73$
$D_3 = 6.13$
$D^4 = 9.53$

and for the total refracting power of the eye,

$$Dt = D_1 + D_2 + D_3 + D_4$$

$$= 58.17$$

As a check, we use the formula that the dioptric power of a system is equivalent to the reciprocal of the focal length, or,

$$Dt = \frac{1}{A\,F}$$

$$= \frac{1}{17.13}$$

$$= 58.38$$

The difference in the two above values is due to the fact that, by finding the power, surface by surface, the thickness is not considered and also to the fact that there is a distance between the principal planes, i. e., $P_1\,P_2$ O. To demonstrate; D of the cornea equals the reciprocal of 24.40 which is 40.98, but $D_1 + D_2 = 42.51$, giving the difference, 1.53 D., due to the thickness of the cornea. For the crystalline we get a difference of 0.37 D. due to thickness.

The Aperture System of the Eye

The theory of Gauss, which has been used in the derivation of the formulae used above, is presented on the supposition that the aperture is very small. In other words, the ray of light must follow relatively close to the principal axis. In the case of the eye the aperture is by no means small, and many errors of ocular refraction are, undoubtedly, due to the great angle at which light enters the eye. In optic instruments of precision an aperture of over ten degrees is hardly accepted. With a pupillary aperture of four millimeters, the aperture of the cornea would be at least twenty degrees.

The pupil is seen neither in its true position nor at its real size, as the following results will show. The general formula in use for this solution is;

$$1 = \frac{F_1}{u} + \frac{F_2}{v}$$

F_1 being measured from the first principal plane

u being measured from the first principal plane

F_2 being measured from the second principal plane

v being measured from the second principal plane

The entrance pupil is the image of the pupil formed by the cornea. The iris is taken as the real object, thus, causing the direction of the light to be reversed, all cardinal points to be reversed and all signs to be changed. Substituting in the formula and solving for v, we have,

$$1 = \frac{F_1}{u} + \frac{F_2}{v}$$

$$\frac{32.61}{3.68} + \frac{-24.40}{v} = 1$$

$$v = 3.10$$

which is measured from P_2. Therefore, the pupil appears 0.57 mm. in front of the actual position. The magnification is,

$$\frac{I}{O} = \frac{-F_2 + v}{-F_2}$$

$$I = 4.51$$

The iris, then, is enlarged in appearance and at the same time swelled in front. What we see is a virtual, or aerial, image of the iris and of the pupil.

Assuming an eye located in the vitreous body viewing the iris and the pupil, the pupil would also be displaced but at a less amount. This would be called the exit pupil and is the image of the pupil as formed by the crystalline lens. Using the same formula, we obtain,

$$1 = \frac{F_1}{u} + \frac{F_2}{v}$$

$$1 = \frac{62.42}{2.42} + \frac{-62.42}{v}$$

$$v = 2.52$$

which is measured from P_2. Therefore, the apparent position is 0.08 mm. back of the real position of the pupil. The magnification formula gives, as the size of the pupil, 4.16 mm.

Comment

No attempt has been made to burden the reader with minute calculations, as only the principal formula and the results are given. As the tracing of a ray through a series of surfaces results in considerable computing the essential points are given in the early part of the paper as an aid to the reader.

All the formula are given in Edwin Edser's "Light for Students" and the final results may be verified by reference to Tscherning "Physiologic Optics," chapter II, third edition.

NOTES, CASES AND INSTRUMENTS

TEMPORARY PARALYSIS OF THE EXTERNAL RECTUS MUSCLE

Walter B. Lyon, Opt. D.

Albert Lea, Minn.

Patient, Girl. Age 16. Came to me complaining of diplopia, when looking at objects to the left of her. This condition started a few weeks before during a rather severe attack of Varicella (Chicken-pox). She had never used a correction nor had she felt the need for one until this time.

The external inspection showed a decided inability of the left eye to turn out. The ophthalmoscopic examination was negative. The ophthalmometer findings were as follows, O. D., the dioptric power of the cornea in the 180 meridian was 41.50 D., in the 90 meridian, 43.00 D., giving a resultant corneal astigmia of 1.50 D. O. S. the dioptric power of the cornea in the 180 meridian was 41.75 D., in the 90 meridian, 42.75 D., giving a resultant corneal astigmia of 1.00 D. Static skiametry showed some hyperopia which was corrected with the following prescription, O. D. + 1.00 D. sph. () + 0.50 D. cyl. axis 90. O. S. +1.00 D. sph. Dynamicly a + 1. 25 D. sph., could be added to this to get a reversal at the near point. Corrected with this formula her visual acuity was 20/20???, but the diplopia was still present. It was with some difficulty that the tonicity was taken and the readings for the initial effort showed some 26 degrees of esophoria.

Prescription given being same as noted above. An eye patch was supplied to cover the right eye to be worn in the morning until school time, at meal time and as soon as she was through with her studying until bedtime. Proper exercises were given and the results at first were rather discouraging as the left eye could not be turned to the left in any direction. If the eye turned to the right, vision seemed normal, but as soon as it reached a central point or straight ahead she seemed powerless to turn it further. After 10 days of exercising she was able to turn the eyes approximately 5 degrees. In two weeks, the diplopia was less. In six weeks she was able to turn the eyes to the left approximately 30 degrees and in two and one-half months she could turn it approximately 50 degrees. At the present time she can turn her eyes to the extreme right and left and in any other direction in comfort.

This paralysis, I believe due to her previous illness, from which she has entirely recovered. Her ductions are now normal, her diplopia disappeared and her esophoria down to less than 8 prism dioptres. She is fully corrected and has no ocular discomfort, being able to do a normal amount of school work.

SUB-NORMAL ACCOMMODATION

L. L. De Mars, Opt. D. F. A. A. O.
Minneapolis, Minn.

In December 1922 a World War Veteran came to my office complain-

ing that he had been unable to get glasses that give him any satisfaction what-so-ever. His history was that before the war he had no trouble with his eyes but while serving in the Cavalry, one day a stone thrown by the hoofs of a horse in front of him hit him in the right eye and caused him to fall from his horse. Since that day he claimed his eyes have constantly bothered him.

Under the direction of the Veteran's Bureau he was sent to an optometrist for glasses. These glasses proved to be as follows O. D.—0.37 D. sph. () + 0.50 D. cyl. axis 180, O. S.—0.25 D. sph. () + 0.50 cyl. axis 90. These he was wearing but was thoroughly dissatisfied with them.

His vision without glasses proved to be O. U. 15/40 O .D. (?) +O. S. 15/40. Opthalmoscopic examination showed normal fundi, but in trying the pupillary reaction to light there was no contraction of the pupil of the right eye, while the pupil of the left eye contracted normally.

Patient is a bookkeeper 34 years of age and in excellent health, but complains that he has great difficulty in seeing at his work which invariably brings on a frontal headache.

Opthalmometric findings were O. U. 100 axis 90. Static retinscopy; O. U. —125 D. cyl. axis 90 giving vision of O. U. 15/15. Checking up subjectively with the fogging method it was found that the following lenses, O. D.—075 D. cyl. axis 90, O. S.—1.00 D. cyl. axis 90, gave equal visual acuity and was determined upon for the distance correction. The muscle tests were not recorded except a notation made of 3 prism Dioptres of Exophoria. Usually when several muscle tests were made if they were normal or nearly so no notation was made. However, using dynamic retinscopy at his working distance it was found that a plus 0.75 D. sph. added to R. E. and a plus 100 D. sph. to the left gave reversal.

These were readily accepted in addition to the cylinders for distance and ease and comfort of vision was immediately experienced. So bifocals were prescribed which he is wearing very satisfactorily today.

UNUSUAL IMPROVEMENT SHOWN IN THE ACUITY OF AN ANISOMETROPE

Carel C. Koch, Opt. D., F. A. A. O.

Minneapolis, Minn.

Patient, E. P. Female. Age 22. Occupation, Saleswoman. Patient came to me on the 25th of November 1923, complaining of an inability to see distance objects clearly with the left eye, and also of a frontal headache. She also said that while walking on stairs or climbing a ladder she noticed a certain dizziness. This patient had never used a correction and on examination I found her fundus to be normal, her blood pressure normal and some corneal astigmatism present. Her tonicity and ductions were both normal at a distance and at the near point and the finished monocular prescription read as follows, O. D. + 0.75 D. cyl. axis 100, O. S.—1.50 D. cyl. axis 170. This gave a normal acuity of vision to each eye separately but she could not however use it binocularily, as it seemed very confusing. I suspected some sort of a cramp and in the effort to relax the ciliary to the utmost I prescribed a treatment glass which fogged vision to 20/50. This was used for 8 days but without any effect. I then re-refracted the case, the findings being about the same as on the initial visit, and to permit binocular vision I then prescribed, + 0.75 D. cyl. axis 100, for O. D. and—0.75 D. cyl. axis 170. for O. S. This gave the left eye an acuity of vision of but 20/40??, or just a little better than it was uncorrected, but did permit comfortable binocular distance vision. Patient was instructed to use this correction until January 1st, and then return to receive the full correction which I believed I could then prescribe with comfort. On February 7th the case returned. She said she felt quite pleased with the progress she had made and that the symptoms she originaly complained of had entirely disappeared. I was somewhat surprised at this, and at

once completed a post-refraction. The findings were about as before, but the accuity of vision of the left eye was now normal. She would accept no less however and as she seemed quite satisfied I permitted her to continue using the correction as originally prescribed. I am somewhat at a loss to account for the improvement in the acuity of the left eye from 20/40?? to 20/20? but insomuch as it has taken place without discomfort, I felt satisfied to leave well enough alone. The case is to return August 1st.

ABSTRACT DEPARTMENT

White, J. E. Physiological Component of Ciliary Cramp. The Optical Journal and Review. Vol. LIII, No. 6, pp. 27-31, 1924.

White in his paper on Ciliary Muscles contends that a cramp of the ciliary muscles is a perfectly natural, inevitable result of certain physiological causes. He considers this cramp merely as a sort of temporary tetanus, caused by First, a continuous stimulation directly to the ciliary body, through the third cranial nerve, due to uncorrected ametropia, Second, an excess stimulation of the ciliary body through the accommodative-convergence centers, which condition obtains when an exophoric inbalance of the lateral muscles exists, and Third an additional sympathetic stimulation of the ciliary body, due to the effect of improper illumination upon the sphincter muscles of the iris.

To correct this ciliary cramp he suggests that the following procedure be followed. Completely fog the patient with strong plus spheres, at the same time adding a 4 to 6 P. D. prism base in. The patient to binocularly fix a large row of illuminated letters on a chart twenty feet away, and if possible have the room in total darkness. Patient to use this formula for at least five minutes.

C. C. K.

Ingham, S. D. and Lyster, T. C. Abnormalities of the Visual Field. Journal of the American Medical Association. Vol. 82, No. 1, 1924.

The authors have here noted their observations in the study of perimetry and of the tangent screen. They have classified the sources of difficulty of visual field plotting into:

1. Faulty fixation;
2. Lack of alert attention on the part of the patient;
3. Incomplete visual defects and relative scotomas;
4. Low visual function in the periphery of the fields;
5. Fatigue—physical, mental or ocular;
6. Psychoneurosis;
7. Inaccurate technic;
8. Faulty illumination;
9. Refractive errors.

In the study of the various perimeters they find that the advantages of the perimeter are:

1. Complete extent of the normal fields can be tested;
2. Test object is always the same distance from the eye;
3. The size of the units of measurement in all parts of the field is uniform;
4. Apparatus is compact and portable.

But each advantage can be followed by a disadvantage which they find to be:

1. Charting of the small and irregular defects (in central areas) is difficult;
2. Excessive time is consumed in the examination with resulting fatigue to the patient and the examiner;
3. Monocular fixation;
4. A small scale record.

Some form of the tangent screen should be used with the perimeter and in the discussion of the various forms the authors have grouped the advantages of the screen as:

1. Charting all defects within 40 degrees of the fixation point with facility and accuracy;
2. Lessening of time consumed and of the corresponding fatigue;
3. Binocular fixation;
4. Large scale record.

The disadvantages of the screen are:

1. Not applicable for the examination of the extremes of the peripheral field;

2. Cumbersome;

3. Varying size to a degree of the visual angle as projected on different parts of the tangent screen.

Technic is always a factor to be considered in the refracting room and the authors find that accuracy in field plotting depends on:

1. Maintenance of binocular fixation;

2. Practical elimination of fatigue;

3. Uniform illumination;

4. Large field for recording observations;

5. Invisibility of records to patient during the examination and in addition;

6. The apparatus must be portable;

7. Permanent records must be secured quickly and easily.

To carry out their idea of combining the advantages of the various instruments and eliminating as much as possible the disadvantages the authors invented a screen. This screen is of the tangent type and is made of a curtain of gray cotton cloth 120x180 cm, mounted on a take-down frame or stand by eyelets slipping over projecting screw heads facilitating the attachment and the removal of the same. A fresh screen is used for each examination.

A vertical triangular partition, perpendicular to the screen, separates the fields of the two eyes. A chin rest steadies the head of the patient so that the eyes are 55cm from the center of the screen and the glabella touching the partition. There are two fixation points attached to the screen, 5cm on each side of the partition and 10cm from each other. Stereoscopic vision is obtained by the use of prisms bases outward and they are rotated if necessary to obtain fusion of fixation points.

The visual field of each eye is thus unrestricted except to the nasal side where it is limited to 5 degrees from the fixation point. The examination of the nasal fields are accomplished by removing the partition and covering the eye not being examined.

The fields are plotted with chalk on the reverse side of the screen, invisible to the patient. The translucence of the cloth makes it possible to see the shadow of the test object at all times from the reverse side of the screen.

The charts are then photographed for permanent record. The fields of both eyes may be charted on one screen or fresh curtains may be used for each. The curtains may be washed and used again. The article is concluded by a series of case reports and charts of fields explaining the cases.

E. O. F.

Lunt, L. K. and Riggs, A. F. Neurotic Disturbances of Eye Function. Archives of Ophthalmology. Vol. 52, No. 4.

The paper discusses the type of case, where pain and other symptoms are complained of, but in which no refractive or organic condition can be found to account for the discomfort.

In the matter of correcting these cases this paper suggests a form of treatment which tends to correct a habit which is frequently acquired by the patient of this type. This habit, is, the too detailed inspection of the object of ocular attention. These cases seem to almost try to spell out each word with a concentration that must of itself be fatiguing. They revert to the method of the child just learning to read, but they lack the freedom of responsibility of the child, and instead of the spasmodic effort of the latter, they attempt to hold the delicate adjustments of the eyes to genuinely tiring concentration. Therefore these cases are restrained to "glance at the print,"—to get a bird's eye view, instead of attempting a microscopic view. It is believed that by re-teaching this method, which is automatically used by most people, unimportant defects can be done away with. Finally there is careful oversight of the physical activities as well as the training of the supposedly handicapped function, so that the gains may become real and permanent.

C. C. K.

George, E. J., Toren, J. A., and Lowell, J. W. Study of the Ocular Movements in the Horizontal Plane. American Journal of Ophthalmology. (III) Series 3, Vol. 6, No. 10, pp. 833-838, 1923.

An instrument called the Ocular-Kinemometer, has been devised by Dr. George to measure the center of rotation of the eyeball, when moving in the horizontal meridian. The exact point or points which form this center

had been approximately located by both Donders and Tscherning but their findings were inacurate and Drs. George, Toren and Lowell performed experiments to definitely locate these points if possible.

The basic principal of the ocular-kinemometer is the determination of a point within the eye through which the visual axis of the eye pass at all times during the excursion of the eye in the horizontal meridian. This point is not the center of motion, nor is it fixed in relation to the structures of the eye, but is fixed in space by the instrument.

The experimental work conducted by these men disproved Donder's theory which presumed that the corneal vertex moved in a circle, the center of which was the center of motion, located on the axis. The findings as recorded by these experiments disclosed a movable center of motion approximately 15 m/m posterior to the apex of the cornea and 1.5 m/m nasalward of the visual axis.

C. C. K.

Sheard, C. Quality as Well as Quantity in the Functions of Accommodation and Binocular Single Vision. The Optical Journal and Review. Vol. LI, No. 11, pp. 35-36, 1923.

In making our present tests for both Accommodation and Heterophoria, Sheard claims, we do not go far enough in merely ascertaining the quantity of the power the muscles controlling these functions can exert, for the brief period of time these tests consume. The quality as well as the quantity is important, inasmuch as the final result of a refraction is based upon the patient's ability to do various work comfortably for some given period of time. Sheard makes the following suggestions:

"A **quality** determination upon the intrinsic muscle should be made by the determination of the nearest point of the maximum concave lenses at or through which reading may be maintained for a continuous period of from one to two minutes.

Duction tests, whether made at near or distant fixation points, are tests upon the **quantity** of innervation and extrinsic ocular muscular contractions in the interests of binocular single vision. A reasonably satisfactory **quality** test —as a first order test at least—consists in finding out whether or not **one-half** of the maximum quantity, which can be demonstrated to exist, can be used and maintained for a period of 60 seconds."

C. C. K.

BOOK NOTICES

PHYSILOGIC OPTICS.

By Dr. M. Tscherning. Adjunct-director of the Laboratory of Ophthalmology at the Sorbonne, Paris. Translated from the original French Edition, Revised and Enlarged by Carl Weiland, M. D. 3rd Edition. 212 Illus. 425 pages. Keystone Publ. Co. 1920.

Physiologic Optics is a philosophic and physiologic science which treats of the normal and the abnormal relations of the eye towards vision. But, in all the study of the eye, whether mechanical, physiologic or anatomic, we must consider that, after all, the final analysis is in the brain. There are many works on Physiologic Optics but Tscherning has collected practical notes on the work and has set them forth in this volume. Tscherning has the honor of filling the vacancy and of continuing the work begun by Javal in the laboratory founded in 1876 for Javal. The text is divided into three books headed, The Dioptrics of the Eye; Functions of the Retina; Ocular Movements and Binocular Vision, which are sub-divided so that the field of optics is covered from the elementary Optic Principals through the Optic System of the Eye, False Images, Spherical and Chromatic Aberration, changes which the Retina undergoes under the influence of light, the Color, Form and Light Senses, Ocular movements and Monocular and Binocular Perception of Depth. At the end of each chapter is a bibliography and in addition there is one at the end of the book. Most of the references are from German and French writers and covers the field more or less completely. The optic system of the eye is worked out but the actual computations are left to the student. Many of the results are not in accordance with other authors, but, as little is actually known of the exact measurements of the portions of the system within the eye, we can not condemn anyone for disagreeing. Tscherning's chapter on Accommodation brings in Helmholt's theory, as well as his own, and the comparison shows that the reason one fails is that the other does not prove it. The whole text is readable but at points it fails to explain explicitly.

E. O. F.

TRACHOMA.

By Dr. J. Boldt. Translated by **J. Herbert Parsons, D. Sc., F. R. C. S.,** and **Thos. Snowball, M. B., C. M.** With an Introductory Chapter by **E. Treacher Collins, F. R. C. S.** 232 pages. Hodder and Stroughton Co., London.

To Dr. J. Boldt, Upper Staff-Surgeon and Regimental Surgeon to the Ninth West Prussian Infantry Regiment, No. 176, we owe a debt of gratitude. It was largely by his efforts that the history of Trachoma down through the last twenty centuries has so admirably been traced, and its treatment outlined in such a clear manner.

His work, Trachoma, as translated by Parsons and Snowball is a text which should become a part of every optometric set of reference books, and which should be used as a reference book or as outside reading, in all optometric schools.

Boldt in his analysis of the spread of Trachoma, lays it largely at the doors of the military, particularly during the 18th and 19th centurys, its spread being caused by the contraction of this highly infectious disease by the troops while in the Balkan States, Africa or Asia and later brought home to the peoples of Continental Europe as the troops returned from their wars and were mustered out of service, thus spreading it among the civilian population.

His reasoning is clear and concise and his chapters on Geographical distribution show that a careful study has been made to get as many facts as possible regarding the present, presence of this form of ocular pathology.

The Symptoms, Aetiology, Diagnosis, Prognosis Treatment and Prophylaxis of Trachoma comprise the last six chapters of the book and go into great detail regarding these phases of its development and later cure. As optometrists, we of course do not treat, nor even come into contact with many of these cases, but our training and knowledge should be such that when a case appears, that it should at once be turned over to the proper authorities for treatment and isolation.

C. C. K.

THE NORTHWEST JOURNAL OF OPTOMETRY

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JACK I. KURTZ, Room 209, Yeates Building, Minneapolis, Minnesota.

A SUGGESTION, FROM THE NORTHWEST TO THE A. O. A.

The American Optometric Association will, we believe, at its coming convention at Kansas City, ratify the new constitution as prepared and submitted by President Martin a year ago. This will mark a turning point in the history of our national body and at this time it is well to pause and consider just what profitable work our large national body can engage in—profitable, in the sense of bettering the educational qualifications of the optometrist, in the sense of making the nation eye conscious, and profitable in the sense of making our large national body a single unit, united for worthy purposes.

From the men of the Northwest comes this suggestion, or rather this set of suggestions which we believe can be carried out by the American Optometric Association. All of the ideas incorporated in these suggestions have been tried and tested for some time before being submitted to our national body and we therefore put forth these suggestions with the earnest hope that the delegates attending the convention at Kansas City will give them the attention we believe they merit.

Bettering the Educational Qualifications of the Optometrist

We believe this can best be done through the establishment of permanent refractive clinics, as it is at clinics of this sort that the optometric practitioners will meet their fellows, AS THEY WORK, and the interchange of ideas will naturally follow.

Many articles have been published regarding Free Refractive Clinics during the past several years. The idea is a good one and should be endorsed fully by all societies. At the coming convention of the American Optometric Association in Kansas City, there will be much discussion regarding the establishment of permanent clinics. The Houghton Plan, the Michigan, the Skeffington, the Kiekenapp, and the Baltimore Plans will be

discussed. These Plans all point to a growing interest in this important matter of doing something for the other fellow. The establishment of clinics of this sort to serve the unfortunate element of community is indeed a worthy work, and the Institute of Ophthalmic Opticians of London, have set a splendid clinical example with their Refractive Hospital. This Refractive Hospital serves a dual purpose, that of aiding those unable to aid themselves and also a bureau of optometric research. Graduate Ophthalmic Opticians (optometrists) serve a period of practical training under the supervision of the staff at this hospital before going into general practice. Thus the clinic helps both the public and the profession.

Clinics of this kind are springing up here in America and the good that can come from work of this kind cannot be measured with a mere unit of exchange. Optometric influence will grow immeasurably as the profession increases the scope of its gratuitous work, and the American Optometric Association, through the Kiekenapp Clinic Plan of national aid for the local societies could do much to make these "paper clinics," realities. Optometric societies of America could find no nobler outlet for their efforts than the establishment of free clinics of this sort.

Making the Nation Eye Conscious.

In this the second portion of our suggestion, the group plan of optometric publicity plays an important part. It has long been agreed that the most satisfactory way of presenting a new idea to the public, regarding a healing art was to do this in a collective manner. With this in mind we offer the Minneapolis plan of eye-sight conservation material. This material is compiled and written in a dignified manner. It outlines the need of eye care and suggests periodic visits to the office of an optometrist. The copy as used by the Minneapolis society runs weekly and during the past several years has created a very favorable impression.

The cost of a campaign of this character would vary of course from city to city and the burden of expense would naturally be carried by the society using the service.

The American Optometric Association should, in a broad manner, direct these campaigns, with reference to the type of copy used. This copy should and could be compiled at a central office and sent out to all societies wishing to conduct such a campaign. In this manner much money could be saved for the local societies in two ways. First, the copy being furnished, the only expense would be the cost of the space, and second, the copy being arranged by professional writers, would be, in our belief at least, good copy and the space used would therefore represent money well spent.

Should the plan prove popular, an advertising field-worker could be appointed to start and carry on these campaigns for the smaller societies. This could be done without cost to the American Optometric Association as the papers carrying the message would, in all probability stand this expense, as it is quite customary for them to pay a commission on all advertising matter furnished them through the regular agency channels.

The adoption of the Minneapolis plan would enable the American Optometric Association to carry on a national eye-sight conservation campaign without the outlay of a substantial sum, and a campaign of this character would do much toward introducing optometry to the public at large and do much toward making the nation eye conscious.

Uniting Our National Body.

To the average optometrist the American Optometric Association is an abstract thing. He never receives any direct personal benefit from the organization and the only members coming into contact with it, are the small number of optometrists attending the national conventions from year to year. This is an unfortunate condition, which can by no means be laid at the doors of the officers of our national society. It would be impossible to write letters to all the members, yet all of the members should be reached by the American Optometric Association, and this can only be done through the medium of a national magazine. A national magazine edited by and for the association.

An optometric journal of this type would have the personal appeal that

none of our present optical journals possess and would bring home to the thousands of members of our society the value of this national organization.

A sixty-four page monthly magazine of this type could be edited, printed and mailed to the 7,000 members of the American Optometric Association at no expense at all to our national society. There would be no need for an increase in dues, nor for a special department with a budget, as this magazine, if properly edited would have an appeal that would make it well worth the attention of the advertising departments of the optical supply houses.

A magazine of this kind would prove an inspiration to the optometric writers and prove also an inspiration to the optometric practitioners receiving it inasmuch as many original papers could be presented to the profession at large which would lead us all to further study and advancement.

Also in a proper department, the business activities of our association could be unfolded from month to month and much of the present dissatisfaction (largely due to a lack of information) eliminated.

If established, this magazine should assume the full responsibilities of a professional and scientific paper. It should carry no scandal and no trivial news items, as the profession of optometry has outgrown such "amateurish" editorial tactics and we therefore believe, that the American Optometric Association needs, the personal contact such as a professional magazine would establish.

Summary

The foregoing suggestions are offered to the American Optometric Association by the men of the Northwest, with a sincere hope that during the coming year these phases of national work can be put into operation. An organization is held in public esteem only by its accomplishments and it is our belief that by the adoption of the Kiekenapp Plan for the aid of local clinics, that by the adoption of the Minneapolis Plan for a national eyesight conservation campaign and by the establishment of a National Optometric Journal, the American Optometric Association can be put into a very favorable light among the practitioners of America and become even more than ever an important factor in the lives of all optometrists.

C. C. K.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

DEPARTMENT OF EDUCATION

Minnesota State Association of Optometrists

Roy S. Dean, Opt. D., Chairman

Professional men are usually supposed to sell their services. Service in optometry means attaining the best knowledge of eyes and glasses, procuring the equipment to enable you to make accurate measurements, knowing how to use the equipment and then analyzing the findings obtained for the best interest of your patient. That is not all, however. There must then come the interpretation of your findings into the lenses that will give your patient the best vision and comfort, the use of the frames best suited to the needs and finally watching the case to know that your work is doing as you wish it to do. This means occassional checking up on your cases, keeping glasses properly adjusted and advising your patient on the use and abuse of their eyes. Optometry is rendering a distinct service when it does these things.

In nearly every center in Minnesota we find a few refractionists (Both medical and non-medical) who merely sell glasses. These men make little or no effort to acquire a proficiency in refractive technic nor do they attempt to be accurate in their scientific work.

To counteract this sort of commercial competition, the optometrist in all communities, whether large or small, where such conditions exist, has only to put himself above these "spec peddling methods."

Take an inventory of your equipment and mental condition. Wipe out any deficit and put your mentality on a par with the best in optometry. Be sure and attend our clinical instructions and our state society meetings. You will soon learn the finer points of optometry and a few of those difficult cases will be simplified and become the means of increased prestige in your home town.

Get the mental ability and the essential equipment. Place it in the proper location and have the right professional atmosphere. (If it is the jewelry store separate it from the rest of the store and let the public know that you are ready to render that service and it will not be long before you will have the care of all the eyes in your community.)

ADMINISTRATIVE BOARD APPOINTED TO GOVERN THE NORTHWEST JOURNAL OF OPTOMETRY

At the annual convention of the Minnesota State Association of Optometry, held in St. Paul in February of this year, a resolution was passed adopting the Northwest Journal of Optometry as the official organ of the Minnesota State association of Optometrists. The Optometric Societies of North and South Dakota being invited to use the news columns of the magazine and to receive it in the same manner as did the Minnesota society. This resolution called for an appointment, by the executive council of the Minnesota society, of an administrative board for the magazine.

This board was created some time in April and had its first meeting about May 1st. The personnel of the board follows: Drs. A. H. Nordland, Minneapolis, Chairman; E. Kiekenapp, Faribault; Roy S. Dean, Duluth; Geo. Jenson, St. Paul; E. Fjelstad, Red Wing; J. Kubicek, Waseca and A. C. Hoffman, Minneapolis, Secretary.

The board at its first meeting reelected Dr. Carel C. Koch, optometrist of Minneapolis, Editor and Dr. J. I. Kurtz, optometrist of Minneapolis, Business Manager. This board will look after the financial problems of the Northwest Journal of Optometry.

1924 A. O. A. DELEGATES

From the Minnesota State Association of Optometrists

At a recent meeting of the Executive Council of the Minnesota State Association of Optometrists, the following men were appointed to represent the Minnesota society at the coming convention of the American Optometric Association at Kansas City.

The delegates appointed were as follows: Drs. A. R. Burnquist, Duluth; A. C. Hoffman, Minneapolis; George

Jenson, St. Paul, and Carel C. Koch, Minneapolis.

The Minnesota State Association of Optometrists will defray the traveling expenses of these delegates, who will make a formal report to the society at its next meeting.

MID-SUMMER CONVENTION

Minnesota State Association Of Optometrists

The Executive Council of the Minnesota State Association of Optometrists have started the formation of plans for the mid-summer convention to be held in August. Although it has not, as yet, been definitely decided, the meeting will probably be held in Waseca, the home city of our president.

At the annual convention of the State society it was suggested that a refractive clinic be arranged at the mid-summer meeting and that the various phases of an ocular refraction be put in charge of optometrists who will conduct the clinic. The plan briefly being that each case be worked on by from seven to ten optometrists, each man making one of the tests necessary for a complete refraction. This group form of refraction can well be done in hotel rooms and the visiting optometrists can watch and assist in the work in an informal manner.

Refractive clinics of this kind have been held before in the centers of the east, with marked success and the Minnesota society should be able to do this work without calling upon outside lecturers to assist. The talent is here and the heads of the association are hoping that the optometric practioners of Minnesota respond in their usual splendid manner.

(Editors Note; A complete announcement of the Mid-Summer convention will appear in the July issue of the Northwest Journal of Optometry).

AN OPTOMETRIC EDUCATIONAL PROGRAM FOR THE LAYMAN

Jack I. Kurtz, B. S., A. O. F. A. A. O.
Secretary, Minnesota State Association of Optometrists

A great deal is being written on the subject of "eyesight conservation" in a general way but little is being done to inform the public that the profession of optometry is greatly interested in conserving the eyesight of the nation If optometry is to progress and attain the same high position other professions attained, then there must be a quickening of the optometric profession, in getting over to the laity some of the basic facts underlying the optometric profession and of its interest in "eyesight conservation."

The day has long since passed when the refractionist's obligation to his patient has been discharged when he fitted him with a pair of lenses, which enabled him to see better. His service must be extended to include instruction of that patient in the care of his eyes in a way that will greatly help in the conservation of his eyesight and the nervous energy. The underlying principals of eye care must be so impressed upon the patient that his visit for refraction will be at such regular intervals that no serious eye defects may have a chance to develop.

The fact that refractive errors or a muscular imbalance may cause, (directly or indirectly) headaches and neuralgia, blepharitis, styes, cataract, astenopia, convergent strabismus and nervous derangements of various types, has been proven beyond a doubt. These facts must be taken into account in the routine practice of the profession, and are responsible for the imperative demand from the deep thinking, highminded and unselfish members of the optometric profession for the getting over to the layman the principles underlying "eyesight conservation." If defective eyes are the cause of so many ills and human sufferings, then our duty is not only to train and teach our patients these facts, but to set ourselves to the task of getting this information over to the poor and the ignorant, who know nothing at all of these truths.

How can this educational program for the layman be carried out? This is a very vital question and the writer believes that this program can best be carried out by the national and the state associations, through the use of the following agencies:

(a) The daily and weekly press.
(b) Public Exhibits.
(c) Free Public Eye Clinics.

The writer wishes to present a plan and explain here the workings of the

first two enumerated agencies, which come under his plan. As for the third the Free Eye Clinics, there are several plans for the carrying on of these clinics namely the "Kiekenapp Clinic Plan" the "Skeffington Plan" and the "Michigan Plan" each one of them is a forward step in the right direction.

How to make use of the daily and weekly press? A publicity department should be established in each state. Material which is of interest to the reading public to be sent out for publication regularly to the newspapers. This system of publicity has been instituted by the Minnesota State Association of Optometrists and works out very successfully. Dr. H. B. Kollofski is in charge of this department.

The secretary informed the members of the State Society that "eyesight conservation publicity material" will be sent to all members who care to have an educational campaign carried on in their respective localities to help make the public "eye conscious". The members were instructed to get in touch with the editors of their local papers and arrange for the publication of this educational material. The results were marvelous. Some optometrists have made arrangements with as many as four and five papers to publish this material. Copy is sent to the members directly from the Association Secretary's office. This material is to be published twice a month, and probably later on, once a week. It is estimated that the value of the space which will be used in this educational campaign will by far exceed the total amount of cash taken in by the Association from the annual membership dues.

The writer believes that this publicity work could be carried on more economically and efficiently through the national association publicity department than through the local. The plan is simple. An expert copy writer to be engaged to supply one article a week. These articles to be multigraphed in quantity lots at the office of the national secretary and be distributed from that office to the state secretaries, who in turn will mail the copy to the membership.

This is a simple, efficient and inexpensive form of publicity. The value of space used in this way would be worth many times the total amount of dues paid in by the members into the national and state associations and is considered by some by far more effective then paid publicity.

Publicity through public exhibits is another form of publicity which the profession of optometry has not utilized to the fullest extent. Whenever there is a chance for optometry to be represented in a dignified way at any of the public exhibits such as health exhibits, vocational exhibits and at State Fairs advantage should be taken of the opportunity. The Dental profession for example never passes up an opportunity to put the "save your teeth" message across. Why not optometry? At these exhibits there are wonderful opportunities for publicity such as a prize for the best pair of eyes and prizes for the best essays written on "eyesight conservation."

These forms of publicity should be developed in every state in the union and deserve the consideration and support of the American Optometric Association.

CLINICAL DEMONSTRATIONS END.

Head-of-the-Lakes Optometric Society

The clinical demonstration carried on by the Head-of-the-Lakes Association came to a close May 1st, with a demonstration of the Genothalmic Unit and Miltiple test chart, by Dr. Burquist. On April 24th, Mr. A. H. Askeland of the Twin Ports Optical Co. gave a demonstration of frame fitting and the taking of facial measurements.

One of the principle points brought out was that the average practitioner does not fit a frame by the facial measurements, but rather by using a frame that apparently fits the face. While the practice is good the principle is wrong in that, that we must carry an endless amount of stock. Another point was the noticeable increase in fitting E. L. S. frames. This principle, too, is wrong as fully as many cases require a regular shank as there are that require an extra long.

These meetings have been carried through for a period of seven weeks with a very noticeable increase in attendance at each meeting, and it is the consensus of opinion of the men of the Head-of-the-Lakes Society that the State Society could do no greater work than to give one day to a demonstration of this kind at the next annual meeting.

KIEKENAPP CLINIC PLAN ENDORSED

A special meeting of the Executive council of the Minnesota State Association of Optometrists was called by President Kubicek, the last week in April. The meeting was held in Minneapolis at the offices of Dr. A. H. Nordland. The following men were present: Drs. H. B. Kolloiski, St. Paul; E. Kiekenapp, Faribault; J. Kukicek, Waseca; J. I. Kurtz, Carel C. Koch, A. H. Nordland, A. C. Hoffman and F. Zimmerman, Minneapolis.

Dr. E. Kiekenapp, optometrist, Fairbault, Secretary of the American Optometric Association outlined the Kiekenapp Clinic Plan in detail and after some discussion the counsel instructed the Minnesota delegates to make every effort to have such a plan adopted.

The delegates were also instructed to pledge the whole hearted support of the Minnesota society to the new Constitution of the A. O. A and also to the proposed Code of Ethics.

NORTH DAKOTA OPTOMETRIC ASSOCIATION

Annual Convention

This is just an advance notice to let you know that your officers are working on the plans for our 1924 convention which is to be held in Fargo some time during August. We cannot yet report just what the program will be but the convention will be a good one. Make your plans now to attend the convention at Fargo this summer. We expect to concentrate on clinical work and will have a competent director of clinical work who will lecture on the latest instruments and devices for examining the eyes. There is at the present time a movement in optometric circles to stress the clinical work and not dwell as much on theoretical lectures as in the past. We wish to cooperate in this movement. Campimetry or Perimetry, Dynamic Skiascopy, and Sphygmomanometry will be particularly stressed. So please don't forget that your officers expect to have a "hum-dinger" of a convention this year and are looking for your support. Your officers were more than pleased with the attendance last year and it looked like the N. D. Optometric Association had come to life again. Don't let us fall down this year after such a record as we made last year.

GRAND FORKS DISTRICT OPTOMETRIC SOCIETY

The following optometrists of Grand Forks held a meeting on April 25th at 8:00 P. M. in the offices of Drs. Hendrickson-Anderson, Grand Forks, to discuss the organization of a local optometric society: Dr. R. C. McAllen, Dr. Geo. K. Munro, Dr. A. O. Wold, Dr. E. A. Roton, Dr. E. A. Arhart, Dr. C. G. Hendrickson, and Dr. L. J. Anderson.

The interest manifested was very satisfying and from this it is assured that the organization will be a success and fill a long felt need among optometrists in Grand Forks and vicinity. It is expected that members will be recruited from Grand Forks County. Dr. R. C. McAllen presided as chairman and a committee was appointed to draw up a constitution and by-laws to be presented at the next meeting on May 23rd. Dr. E. A. Roton was elected as secretary-treasurer. A committee consisting of Drs. Arhart and Hendrickson was appointed to propose a plan to counteract the propaganda being spread by the mail order spectacle houses. The society expects to carry on a cooperative publicity campaign in the near future.

OPTOMETRISTS LICENSED BY THE MINNESOTA BOARD

Spring Examinations, 1924

Drs. F. A. Von Fisher, Springfield, Minn.; W. A. Helgeson, Alma, Wis.; J. C. Thompson, Minneapolis, Minn.; A. Illa, Stillwater, Minn.; H. B. Smith, Wells, Minn.; and the following men from St. Paul, Minn.: R. A. Prudden, J. L. Fox, O. A. Albrecht, T. A. Goswitz, G. Henderson, and F. J. Shidla.

SPECIAL REPORT

OPTOMETRIC CODE OF ETHICS

The Executive Council of the Minnesota State Association of Optometrists at a special meeting, held in Minneapolis, adopted the following Optometric Code of Ethics. This code was submitted to the several state societies for ratification and its adoption as the official code of ethics of the Minnesota society indicates a willingness on the part of this society to co-operate with the American Optometric Association in making this code a part of the national by-laws. The code as drawn up by Drs. Nicum, McFadden and Winslow follows:

We do agree to these things:

1. Render the public the best service within us and constantly strive to improve that service.

2. Conduct ourselves in a manner becoming to professional men and women.

3. Aid worthy civic movements, and be considerate of fellow practitioners.

4. To meet and study at frequent intervals with other optometrists to keep abreast of the best practices in optometry; and to aid and consult with fellow practitioners when requested.

5. To make examination of the eyes the paramount feature, not the sale of glasses.

6. To impress upon the public the importance of careful and correct ocular service.

7. To equip our offices with the latest and best instruments.

8. To discontinue the sale of merchandise which has no place in optometry.

9. To limit our publicity to:
   (1) Conservation of Vision.
   (2) Optometrical Service.

10. To charge for, and to collect, a reasonable fee for eye examinations.

11. To charge a fee openly, both by verbal statement and upon the bill, not concealing said fee within the cost, thereby giving the patron reason to believe that service is rendered "free."

12. We consider that optometry may be best presented to the public through organized effort, rather than individual. To this end we will endeavor, at proper times and in proper places, to preach the conservation of vision, and to teach methods whereby this may be obtained.

13. We believe that organized optometry can best be served by group publicity, as also by magazine and newspaper articles in which the author does not seek to present his own personality.

14. We believe that newspaper "card" is the correct way of presenting ourselves in the press in a direct advertising sense.

15. We agree to discontinue the use of handbills, billboard advertising, billposter advertising, large painted signs on buildings, all types of novelties, stickers of all kinds, except inside of cases; blotters, manufacturers' literature, freely distributed; street car advertising, theater program, theater curtain, lantern slides, and signs reading; "Eyes Examined (or tested) free."

16. Not to advertise the prices of lenses, frames or supplies.

17. To discontinue window advertising, except in dignified and legitimate manner.

18. To discontinue and remove from refracting rooms, waiting rooms and other public rooms of our business places, signs of manufacturers relating to supplies. To discontinue advertising articles or supplies as "better" or in any way superior in quality for the price asked, to that of other optometrists or refractionists.

19. To discontinue publicly advertising business ability as superior to that of others; reliability as superior to that of others; professional ability as superior to that of others.

20. To discontinue methods of practice which are manifestly "unfair" by those recognized practices of the public within which we dwell.

21. Where others who are doing refracting work are unethical and resort to unfair and unethical means, we are not to retaliate in kind until we have sought by all reasonable means to win them from errant methods, to interview them personally, or by letter, or by friends, or by judicious printed matter, publicly proclaimed, and in terms which will in no way lower our own dignity, seeking thereby to elevate their own standard of procedure and win them to our side of justice.

22. When others practice optometry and they are manifestly unqualified for the work, we are to seek them personally, by letter and by other just means, seeking to elevate their moral tone, their educational status, their equipment, or their other deficiencies, endeavoring to bring them to a higher and proper level. When other means have failed, we should bring them to the attention of higher authority.

23. When there is a difference of opinion with respect to ethical and non-ethical practices, customs or behavior, we should seek to bring about a meeting of all those engaged in Optometry and have a dignified discussion, endeavoring to establish rules of practice.

24. It is unprofessional and prohibited to split fees, pay bonuses or offer, or to receive, any pecuniary benefits from others who may at various times refer patrons.

25. It is unprofessional and prohibited to enter into mail-order advertising of eye-glass service.

26. It is unprofessional to seek out patrons by bribes, rebates, discounts or other profit-sharing means, through friends, relatives, or patrons.

27. It is unprofessional to seek patronage by solicitous means, personal or through others.

28. It is unprofessional and unethical to promise cures, relief or benefit from lenses, or from treatment, or by other means than that one will do as well as lies within his power to correct and neutralize the errors of refraction and muscular anomalies, with the hope but not with the assurance of benefit or relief.

29. It is unprofessional and unethical to undertake practices under a name of a company or organization in which the principal member or members of the organization are not actively engaged in the actual practice of refraction.

30. It is unprofessional to conduct an optometric practice in which the name or names of the principal men are not named publicly in their printed matter upon door-plates, and other similar announcements.

31. It is unprofessional and unethical to travel from town to town, putting up in hotels and houses and doing refraction work without proper equipment and lighting facilities.

32. It is unprofessional and unethical to use low-grade lenses or lenses of a pattern which are not as properly designed and adapted to the correction of the errors of vision as are possible to obtain, basing the price of service and such supplies upon their cheapness, unless it is patent that the patron cannot afford to purchase the higher grade and perfected lenses, and in all such cases the factors should be carefully explained.

33. It is unprofessional for an optometrist who holds an office in any optometric association to use such position for advertising purposes.

34. It is unprofessional and unethical for an optometrist to make use of his diplomas and certificates in such a way as to be considered advertisements.

35. No member should advertise in a way which would lead to the supposition that he had a medical training unless he has such a training. But it is not unethical to permit himself to be styled "doctor" by his patrons.

36. It is unethical and forbidden to keep office or place of business on national holidays, State holidays, or Sundays. This refers to the regular manner of "keeping open" but not to responding to an emergency for a particular case.

CORRECTION

In the original paper, "Comfortable Vision by Means of the Dynamic Refractor" which ran in the May issue of this Journal, Dr. Kiekenapp, in describing the refractor, made this statement: "The prisms on the refractor total twelve prism dioptres base down, etc." This he requested changed to read as follows: "The prisms on the refractor consists of two six degree prisms, one base down and one base up, etc." The correction came in too late to be made in the May issue.

Editor.

NEWS ITEMS

MINNEAPOLIS SOCIETY HONORS SHEARD

At the last business session of the Minneapolis Association of Optometrists, Dr. Charles Sheard, of Rochester, Minnesota was made an Honorary member of the Association.

Dr. Sheard has addressed the body on several occasions and the members expressed great pleasure at having America's greatest refractionist so near at hand.

MINNESOTA MAN TO SPEAK AT NATIONAL CONVENTION

Dr. Roy S. Dean, optometrist of Duluth, Second Vice-President of the Minnesota State Association of Optometrists will appear on the program of the American Optometric Association's Convention at Kansas City. His subject will be "Industrial Eye-Work." His colleagues in the northwest know how well qualified he is to speak on this subject and those attending the National Convention are looking forward to another splendid address by this practitioner.

OPTOMETRISTS SKILL ENABLES GIRL TO SEE

Dr. H. Kornmesser, optometrist of Jamestown, N. D., collaborator of the Northwest Journal of Optometry was recently called upon to work on one of the inmates of the State School for the Blind at Bathgate, N. D. After a trying and painstaking series of refractions the girl, a student, twenty years of age, was finally fitted with lenses which enabled her to be discharged from the institution and which enabled her to walk about, for the first time in her life without other aid. Dr. Kornmesser, due to the work on this case received much favorable comment in the press of North Dakota.

REFRACTIVE TECHNIC DEMONSTRATED.

Dr. L. L. DeMars was chief of clinic at a Refractive Demonstration given before the Minneapolis Association of Optometrists at its monthly meeting during April. Dr. C. C. Koch, spoke on Oculo-Prism Treatments at the May meeting of the same society. Detailed reports of both meetings will appear in later issues of the Northwest Journal of Optometry.

OPTOMETRIC CLINICS CHIEF FEATURE AT COMING CONVENTION

Six optometrists of national standing will conduct refractive clinics at the coming convention of the American Optometric Association, to be held in Kansas City, June 9th to 14th. Each of these clinics will be held in a model refracting room with plenty of gallery space for the attending optometrists. All of the phases of a modern refraction will be demonstrated and those attending will find much of the newer technic, clearly demonstrated. It is to be hoped that many of the practitioners of the northwest will be able to attend, as these educational features alone will make the trip one well worth taking.

SPECIAL CAR TO KANSAS CITY

The Rock Island R. R. has offered the optometrists of Minnesota the use of a private car to and from the coming convention at Kansas City. Dr. C. C. Koch is making arrangements and it is hoped that the men attending the convention will be able to get together and go in a body. The cost of making a trip this way is the same as going alone and the fun of going together will be well worth the trouble of writing in and making the arrangements necessary.

LOCAL SOCIETIES FIGHT EYEGLASS TAX

During the past month the Minnesota State Association of Optometrists, the St. Paul Optometric Society and the Minneapolis Association of Optometrists sent requests to the Minnesota senators at Washington asking their cooperation in the matter of removing the proposed nuisance tax on glasses. Many of the private practitioners of the state wrote personal letters explaining the injustice of such legislation and it is hoped that the danger of such a form of taxation is passed.

The American Optometric Association is of course directing the fight and we have every reason to believe that we shall be successful. The outcome, however, is in doubt at the time of going to press.

CURRENT LITERATURE

These are the titles of papers bearing on optometry. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the Authors name in **heavy face type.** The abbreviations mean: (Ill.), illustrated; (Pl.), plates; (Abst.), indicates that it is an abstract of the original article; and (Dis.), that discussion is published with paper.

GENERAL REFRACTION

Aronsfeld, G. H. The Eyes of Children. (Ill.) Opt. Age. Vol. 21, No. 1, pp. 46-50.

Black, M. Twins With High Hyperopia. Amer. Jour. of Oph. Series 3, Vol. 7, No. 5, pp. 375-376.

Buttler, T. H. Modern Optical Methods in the Examination of the Eye. The Ref. (Brit.) Vol. 13, No. 151, pp. 69-70.

Copeland, H. W. When the Near Point is Far and the Far Point is Near. Opt. Jour. and Rev. Vol. LIII, No. 18, p. 27.

Coque, M. Perimetry in Ophthalmic Work. The Optician (Brit.). Vol. LXVII, No. 1723, pp. 114-117.

Culverhouse, E. Lenses Other Than White. Can. Optom. Vol. 6, No. 4, pp. 103.

Kiekenapp, E. Comfortable Vision by Means of the Dynamic Refractor. (Ill.) N. W. Jour. of Optom. Vol. I, No. 5, 82-84.

Markley, H. R. Standardizing the Routine. Opt. Age. Vol. 21, No. 1, pp. 19-20.

Parker, J. W. Subjective Methods. Opt. Jour. and Rev. Vol. LIII, No. 17, pp. 25-26.

Perrigo, C. A. Visual Acuity on a Percentage Basis. Opt. Age. Vol. 21, No. 1, pp. 27-28.

Woodburn, B. F. A Thorough Refraction. N. W. Jour. of Optom. Vol. 1, No. 5, pp. 86-87.

PRACTICAL OPTOMETRY

Lando, M. N. Bifocals. (Ill.) Opt. Age. Vol. 21, No. 1, pp. 23-26.

Shelley, J. J. Art of Adjusting Bifocal Lenses. (Ill.) Opt. Jour. and Rev. Vol. LIII, No. 18, pp. 29-30.

Shelley, J. J. Eye-Glass Fitting Simplified. The Optician (Brit.). Vol. LXVII, No. 1723, pp. 110-11.

INDUSTRIAL EYE WORK

Barrett, Sir James. Vision of Railway Servants. (Abst.) Amer. Jour. of Oph. Series 3, Vol. 7, No. 5, p. 411.

Dayton, F. B. Relation of Visual Defects to Auto Accidents. Opt. Jour. and Rev. Vol. LIII, No. 18, p. 28.

Dean, R. S. Ten Worthwhile Points Developed in Industrial Eye Work. N. W. Jour. of Optom. Vol. 1, No. 5, p. 90.

Eimer, E. The Michigan Plan of Optometric Clinics. Opt. Jour. and Rev. Vol. LIII, No. 17, pp. 23-24.

OPTOMETRY

Koch, C. C. Methyl Alcohol. N. W. Jour. of Optom. Vol. 1, No. 5, p. 90.

Krause, A. H. Near Success in General Optometric Practice. Opt. Age. Vol. 21, No. 1, pp. 36-43.

Pointell, C. H. Mental Vision. Opt. Age. Vol. 21, No. 1, pp. 31-32.

The Scope of Optometry (Special Report). Opt. Age. Vol. 21, No. 1, pp. 33-35.

OCULAR MUSCLES

Aronsfeld, G. H. A Demonstration of the Ocular Muscles. (Ill.) Opt. Age. Vol. 21, No. 1, pp. 21-22.

Haustein, J. Oculo-Prism Treatment. N. W. Jour. of Optom. Vol. 1, No. 5, pp. 84-86.

Jackson, F. D. The Oblique Muscles. (Ill.) Can. Optom. Vol. 6, No. 4, pp. 104-106.

OCULAR PATHOLOGY

Agatston, S. A. Muscle Retroplacement in the Correction of Squint. Amer. Jour. of Oph. Series 3, Vol. 7, No. 5, pp. 361-364.

Hansell, H. F. Sarcoma of the Choroid. Amer. Jour. of Oph. Series 3, Vol. 7, No. 5, pp. 359-361.

Howard, H. F. Trachoma Among School Children in China. (Abst.) Amer. Jour. of Oph. Series 3, Vol. 7, No. 5, p. 408.

Howard, P. F.. Focal Infections. (Abst.) N. W. Jour. of Optom. Vol. 1, No. 4, pp. 68-70.

Marschutz, H. S. Motion Picture Making Brings New Dangers to Vision. (Abst.) N. W. Jour. of Optom. Vol. 1, No. 4, p. 68.

Millauro, O. The Artificial Human Eye. The Optician. (Brit.). Vol. LXVII, No. 1723, pp. 109-110.

Muskat, I. I. Lipemia Retinalitis. (Pl.) Amer. Jour. of Oph. Series 3, Vol. 7, No. 4, pp. 288-292.

Sattler, C. H. Clinical Picture of Tobacco-Alcohol Amblyopia. (Abst.) Amer. Jour. of Oph. Series 3, Vol. 7, No. 4, pp. 326-327.

Williams, C. B. Rupture of the Choroid. (Ill.) Amer. Jour. of Oph. Series 3, Vol. 7, No. 5, pp. 374-375.